WWV, WWVH, and WWVB

The National Institute of Standards and Technology (NIST) and the United States Naval Observatory (USNO) are the official timekeepers in the United States.

The National Institute of Standards and Technology is responsible for providing the ultimate measurement reference for all physical quantities in the United States. NIST disseminates time and frequency signals by radio, satellite, telephone, and the Internet to the general public. The United States Naval Observatory is a Department of Defense (DOD) organization whose primary functions are to provide time for navigation and military purposes and its primary focus is directed towards meeting the real time requirements of the Departments of Defense. The USNO Master Clock located in Washington, D.C., provides Atomic timing signals used in the Global Positioning System and other DOD time sensitive functions.

NIST radio stations WWV (Fort Collins, Colorado) established in 1923, and WWVH (Kauai, Hawaii) established in 1948, broadcast time and frequency information 24 hours per day, 7 days per week to millions of listeners worldwide based on precision Atomic clocks which are located at NIST facilities in Boulder, Colorado. The broadcast information includes time announcements, standard time intervals, standard frequencies, UT1 time corrections, a Binary Coded Decimal (BCD) time code, geophysical alerts, marine storm warnings, and Global Positioning System (GPS) status reports.

All broadcast frequencies used by WWV and WWVH are in the high frequency (HF) portion of the radio spectrum. This part of the radio spectrum is commonly referred to as "short wave." General coverage short wave receivers are capable of receiving WWV and WWVH on all of the available frequencies. Both WWV and WWVH broadcast on frequencies in AM mode at 2.5 MHz, 5.0 MHz, 10.0 MHz, and 15.0 MHz. WWV additionally broadcasts on 20.0 MHz. Each frequency is broadcast from a separate transmitter. WWV uses a male voice and WWVH uses a female voice. Often in the nighttime hours, it is possible to hear both stations simultaneously. The two voices never speak at the same time. Although each frequency carries the same information, multiple frequencies are used because the quality of HF reception depends on many factors such as location, time of year, time of day, the frequency being used, and atmospheric and ionospheric propagation conditions. The variety of frequencies makes it likely that at least one frequency will be usable at all times. The WWV and WWVH signals are audible to humans and are used to automatically synchronize clocks, electronic equipment, and set frequency measuring devices.

In addition to the time signals broadcast on the HF portion of the radio spectrum, NIST radio station WWVB (Fort Collins, Colorado) established in 1956, continuously broadcasts time and frequency signals at 60 kHz on the low frequency (LF) portion of the radio spectrum. This part of the radio spectrum is commonly referred to as "long wave." WWVB signals are inaudible to humans and specialized long wave receivers are needed to receive the signals. These time signals are used by millions of people throughout North America to automatically synchronize consumer electronic products such as wall clocks, clock radios, wristwatches, and other products capable of receiving the LF signal. A sister station, WWVL, discontinued operation in July 1972 and formerly operated on the very low frequency (VLF) portion of the radio spectrum at 20 kHz.

The time announced during NIST broadcasts is Coordinated Universal Time (UTC). UTC is a 24-hour clock system. The hours are numbered beginning with 00 hours at midnight through 12 hours at noon to 23 hours and 59 minutes just before the next midnight. UTC differs from your local time by a specific number of hours. The number of hours depends on the number of time zones between your location and the location of the zero degree or prime meridian, which passes through Greenwich, England. There are 24 time zones in the world, twelve before the prime meridian and twelve past the prime meridian. The 180 degree meridian is known as the International Date Line. Greenwich Mean Time (GMT) or Zulu Time (Z) is equivalent to Coordinated Universal Time (UTC).

Since 1975 NIST time and frequency signals have also been relayed to most of the Western Hemisphere by satellites positioned high above the equator. Weather satellites operated by the National Oceanic and Atmospheric Administration (NOAA) broadcast NIST signals.

Additionally, NIST provides Internet time services using the Network Time Protocol (NTP). Software downloaded from NIST can be used to automatically adjust computer clocks to UTC. For computers not connected to the Internet a dial-up modem service is available. You can manually set a clock to UTC using the www.time.gov web site and observing the time display. A telephone time service, which carries the audio portions of the WWV and WWVH broadcasts can also be heard by dialing (303) 499-7111 for WWV (Colorado), and (808) 335-4363 for WWVH (Hawaii).